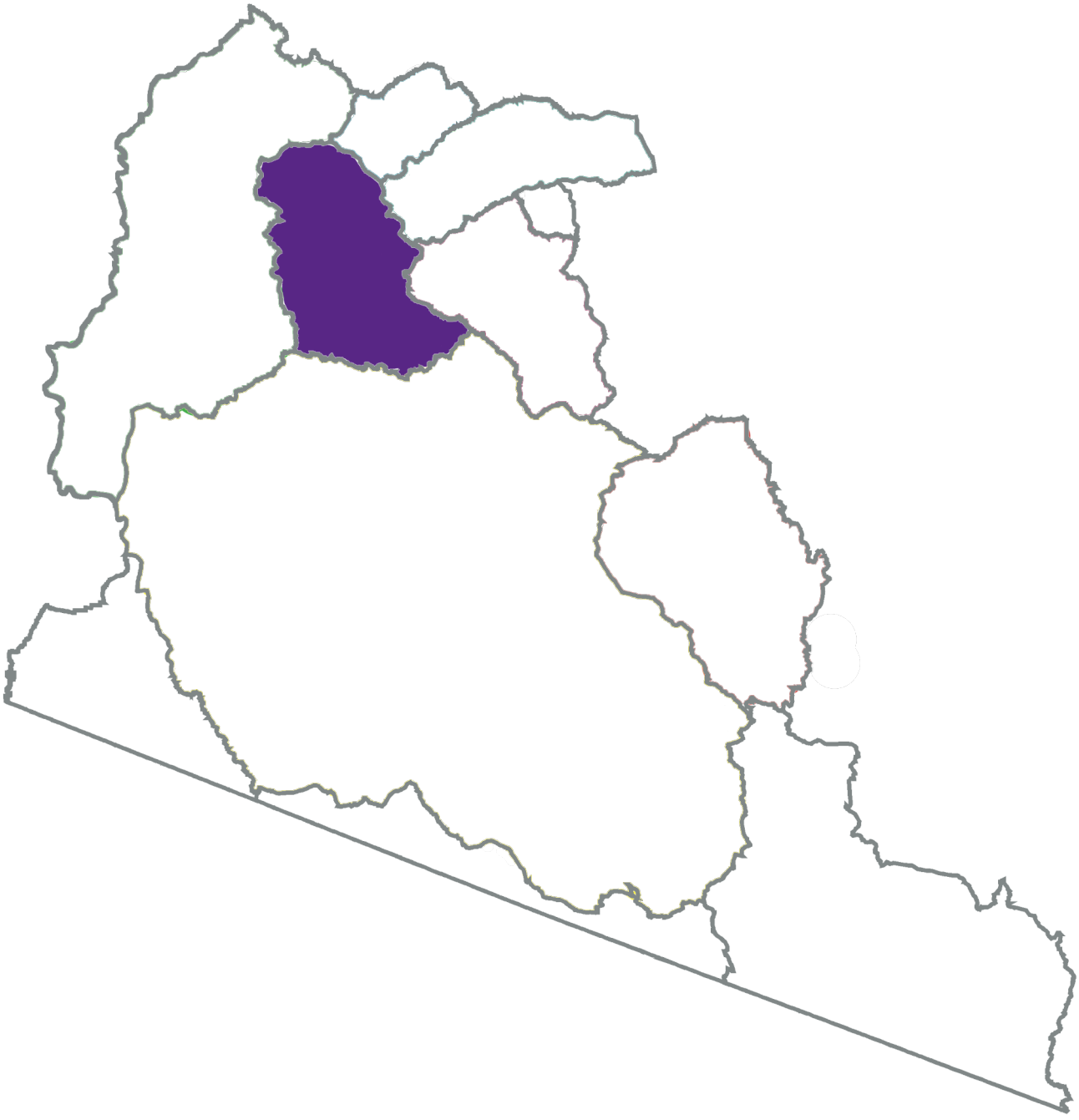
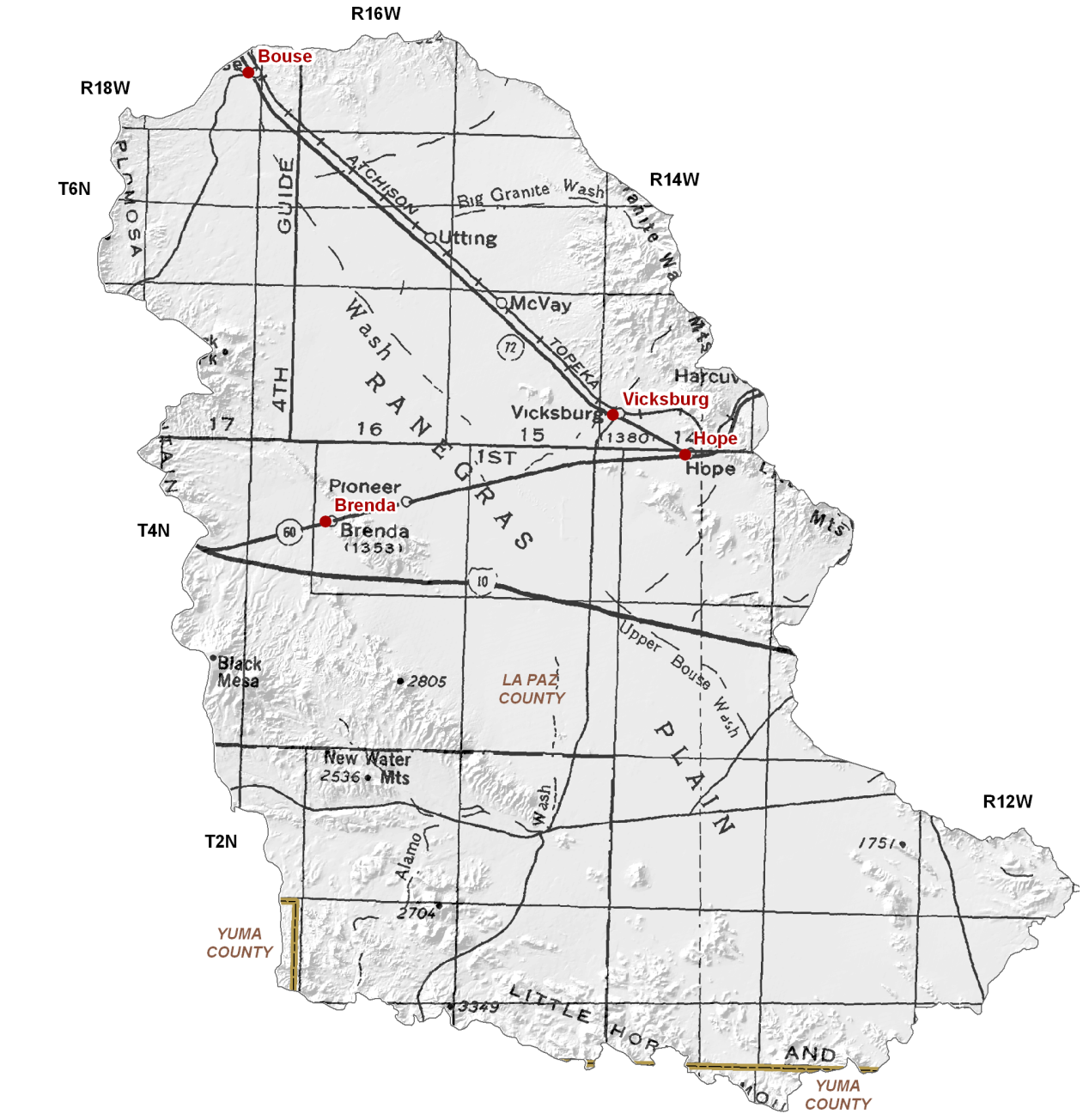
Section 7.7
Ranegras Plain Basin



7.7.1 Geography of the Ranegras Plain Basin

The Ranegras Plain Basin, located in the northern part of the planning area is 912 square miles in area. Geographic features and principal communities are shown on Figure 7.7-1. The basin is characterized by a plain bordered by mountain ranges. Vegetation types include Lower Colorado River Valley and Arizona Uplands Sonoran desertscrub. (See Figure 7.0-7)

- Principal geographic features shown on Figure 7.7-1 are:
    - Basin communities of Bouse, Brenda, Hope and Vicksburg
    - Bouse Wash in the northern portion of the basin
    - Ranegras Plain in the center of the basin bordered by the Plomosa, New Water and Little Horn Mountains in the west and the Granite Wash and Little Harquahala Mountains in the east
    - The highest point in the basin at 2,704 feet in the New Water Mountains
- Not well shown on Figure 7.7-1 is the lowest point in the basin at 930 feet near the Town of Bouse.



Base Map: USGS 1:500,000, 1981

0 3 6 Miles

COUNTY

City, Town or Place

Figure 7.7-1
Ranegras Plain Basin
Geographic Features

7.7.2 Land Ownership in the Ranegras Plain Basin

Land ownership, including the percentage of ownership by category, for the Ranegras Plain Basin is shown in Figure 7.7-2. The principal feature of land ownership in this basin is the large proportion of U.S. Bureau of Land Management land. A description of land ownership data sources and methods is found in Volume 1, Section 1.3.8. Land ownership categories are discussed below in the order of largest to smallest percentage in the basin.

U.S. Bureau of Land Management (BLM)

- 66.3% of the land is federally owned and managed by the Yuma Field Office of the Bureau of Land Management.
- This basin includes the 25,000 acre New Water Mountains Wilderness and 12,000 acres of the 100,000 acre Eagletail Mountains Wilderness. (See Figure 7.0-9)
- Land uses include grazing, resource conservation and recreation.

National Wildlife Refuge

- 15.5% of the land is federally owned and managed by the U.S. Fish and Wildlife Service as the Kofa National Wildlife Refuge (NWR).
- Land uses include resource conservation, wildlife protection and recreation.

Private

- 11.1% of the land is private.
- Land uses include domestic, commercial and agriculture.

State Trust Land

- 7.1% of the land is held in trust for the public schools under the State Trust Land system.
- Primary land use is grazing and agriculture.

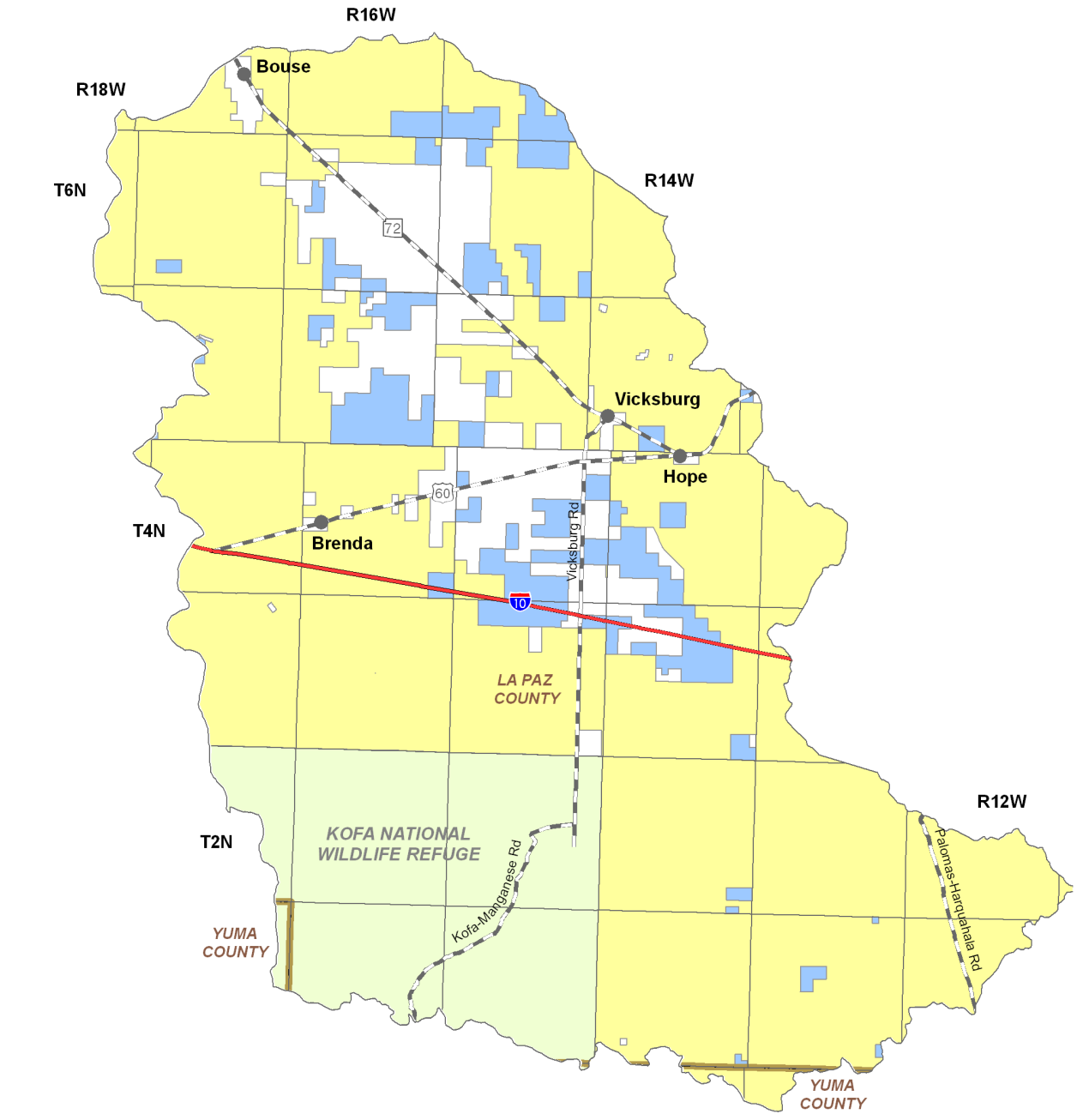


Figure 7.7-2
Ranegras Plain Basin
Land Ownership

7.7.3 Climate of the Ranegras Plain Basin

The Ranegras Plain Basin does not contain NOAA/NWS, Evaporation Pan, AZMET or SNOTEL/ Snowcourse stations. Figure 7.7-3 shows precipitation contour data from the Spatial Climate Analysis Service (SCAS) at Oregon State University. A description of the climate data sources and methods is found in Volume 1, Section 1.3.3.

SCAS Precipitation Data

- See Figure 7.7-3
- Average annual rainfall is as high as 14 inches along the eastern basin boundary north of Vicksburg and as low as four inches in the north central portion of the basin.

Table 7.7-1 Climate Data for the Ranegras Plain Basin

A. NOAA/NWS Co-op Network:

Station Name	Elevation (in feet)	Period of Record Used for Averages	Average Temperature Range (in F)		Average Precipitation (inches)				
			Max/Month	Min/Month	Winter	Spring	Summer	Fall	Annual
None									

Source: WRCC, 2003

B. Evaporation Pan:

Station Name	Elevation (in feet)	Period of Record Used for Averages	Avg. Annual Evap (in inches)
None			

Source: WRCC, 2003.

C. AZMET:

Station Name	Elevation (in feet)	Period of Record Used for Averages	Average Annual Reference Evaportranspiration, in inches (N*umber of years to calculate averages*)
None			

Source: Arizona Meteorological Network, 2005

D. SNOTEL/Snowcourse:

Station Name	Elevation (in feet)	Period of Record Used for Averages	Average Snowpack, at Beginning of the Month, as Inches Snow Water Content *(Number of measurements to calculate average)*					
			Jan.	Feb.	March	April	May	June
None								

Source: NRCS, 2005

Precipitation Data Source: Oregon State University, 1998

Figure 7.7-3
Ranegras Plain Basin
Meteorological Stations and Annual Precipitation

7.7.4 Surface Water Conditions in the Ranegras Plain Basin

There are no streamflow data, flood ALERT equipment or USGS runoff contour data available for this basin. Reservoir and stockpond data, including maximum storage or maximum surface area, are shown in Table 7.7-4. A description of stream data sources and methods is found in Volume 1, Section 1.3.16. A description of reservoir data sources and methods is found in Volume 1, Section 1.3.11. A description of stockpond data sources and methods is found in Volume 1, Section 1.3.15.

Reservoirs and Stockponds

- Refer to Table 7.7-4.
- There are no large or small reservoirs and 16 registered stockponds in this basin.

Table 7.7-2 Streamflow Data for the Ranegras Plain Basin

Station Number	USGS Station Name	Drainage Area (in mi^2)	Mean Basin Elevation (in feet)	Period of Record	Average Seasonal Flow (% of annual flow)				Annual Flow/Year (in acre-feet)				Years of Record
					Winter	Spring	Summer	Fall	Minimum	Median	Mean	Maximum	
None													

Sources: USGS NWIS, USGS 1998 and USGS 2003.

Table 7.7-3 Flood ALERT Equipment in the Ranegras Plain Basin

Station ID	Station Name	Station Type	Install Date	Responsibility
None				

Table 7.7-4 Reservoirs and Stockponds in the Ranegras Plain Basin

A. Large Reservoirs (500 acre-feet capacity and greater)

MAP KEY	RESERVOIR/LAKE NAME *(Name of dam, if different)*	OWNER/OPERATOR	MAXIMUM STORAGE (AF)	USE	JURISDICTION
None identified by ADWR at this time					

B. Other Large Reservoirs (50 acre surface area or greater)

MAP KEY	RESERVOIR/LAKE NAME *(Name of dam, if different)*	OWNER/OPERATOR	MAXIMUM SURFACE AREA (acres)	USE	JURISDICTION
None identified by ADWR at this time					

C. Small Reservoirs (greater than 15 acre-feet and less than 500 acre-feet capacity)

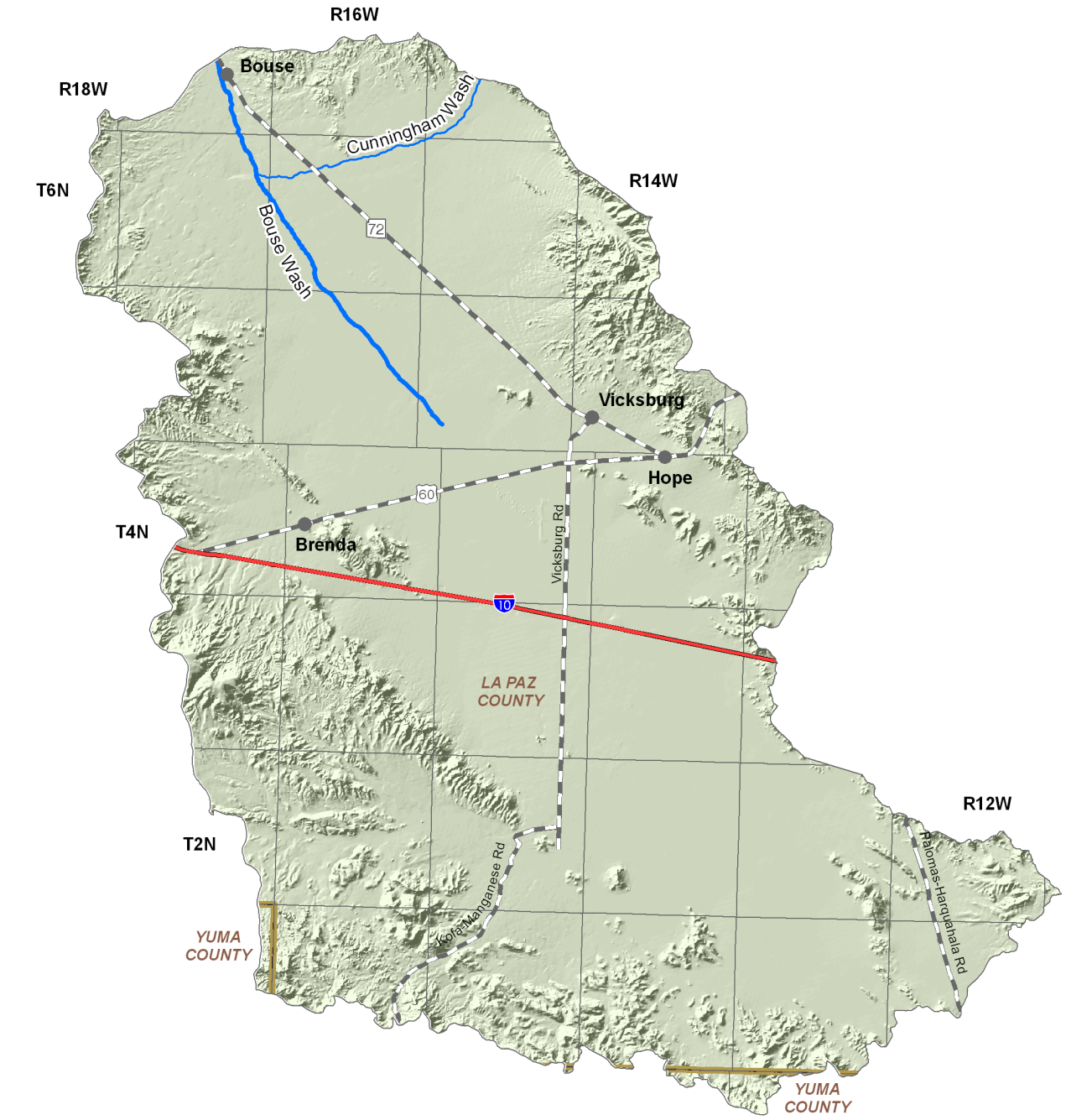
Total number: 0
Total maximum storage: 0 acre-feet

D. Other Small Reservoirs (between 5 and 50 acres surface area)

Total number: 0
Total surface area: 0 acres

E. Stockponds (up to 15 acre-feet capacity)

Total number: 16



0 3 6 Miles

Stream Channel (width of line reflects stream order)
COUNTY
Interstate Highway
Major Road
City, Town or Place

Stream Data Source: ALRIS, 2005

Figure 7.7-4
Ranegras Plain Basin
Surface Water Conditions

7.7.5 Perennial/Intermittent Streams and Major Springs in the Ranegras Plain Basin

The total number of springs in the basin are shown in Table 7.7-5. There are no perennial or intermittent streams and no major or minor springs in the Ranegras Plain Basin. A description of data sources and methods for intermittent and perennial reaches is found in Volume 1, Section 1.3.16. A description of spring data sources and methods is found in Volume 1, Section 1.3.14.

- The total number of springs, regardless of discharge, identified by the USGS is two.

Table 7.7-5 Springs in the Ranegras Plain Basin

A. Major Springs (10 gpm or greater):

Map Key	Name	Location		Discharge (in gpm)	Date Discharge Measured
		Latitude	Longitude		
None identified by ADWR at this time					

B. Minor Springs (1 to 10 gpm):

Name	Location		Discharge (in gpm)	Date Discharge Measured
	Latitude	Longitude		
None identified by ADWR at this time				

C. Total number of springs, regardless of discharge, identified by USGS (see ALRIS, 2005 and USGS, 2006): 2

7.7.6 Groundwater Conditions of the Ranegras Plain Basin

Major aquifers, well yields, estimated water in storage, number of index wells and date of last water-level sweep are shown in Table 7.7-6. Figure 7.7-5 shows aquifer flow direction and water-level change between 1990-1991 and 2003-2004. Figure 7.7-6 contains hydrographs for selected wells shown on Figure 7.7-5. Figure 7.7-7 shows well yields in five yield categories. A description of aquifer data sources and methods is found in Volume 1, Section 1.3.2. A description of well data sources and methods, including water-level changes and well yields, is found in Volume 1, Section 1.3.19.

Major Aquifers

- Refer to Table 7.7-6 and Figure 7.7-5.
- The major aquifer is basin fill.
- Groundwater flow is generally from south to north, with a cone of depression caused by irrigation pumping west of Hope.

Well Yields

- Refer to Table 7.7-6 and Figure 7.7-7.
- As shown on Figure 7.7-7, well yields in this basin are generally greater than 1,000 gallons per minute (gpm).
- One source of well yield information, based on 68 reported wells, indicates that the median well yield is 1,150 gpm.

Natural Recharge

- Refer to Table 7.7-6.
- There are five estimates of natural recharges ranging from less than 1,000 acre-feet per year to between 4,550 acre-feet and 6,050 acre-feet per year.
- The largest source of natural recharge is infiltration of runoff from the Bouse Wash and its tributaries (ADWR 1994).

Water in Storage

- Refer to Table 7.7-6.
- There are four estimates of water in storage for this basin ranging from nine million acre-feet to 27 million acre-feet, both to a depth of 1,200 feet.

Water Level

- Refer to Figure 7.7-5. Water levels are shown for wells measured in 2003-2004.
- The Department annually measures 19 index wells in this basin, hydrographs for six index wells are shown on Figure 7.7-6.
- The deepest water level shown on the map is 363 feet south of Vicksburg and the shallowest is 75 feet at Bouse.

Table 7.7-6 Groundwater Data for the Ranegras Plain Basin

Basin Area, in square miles:	912	
Major Aquifer(s):	**Name and/or Geologic Units**	
	Basin Fill	
Well Yields, in gal/min:	Range 812-3,310 Median 1,993.5 (14 wells measured)	Measured by ADWR and/or USGS
	Range 12-4,000 Median 1,150 (68 wells reported)	Reported on registration forms for large (> 10-inch) diameter wells
	Range 85-3,310	ADWR (1994)
	Range 0-2,500	USGS (1994)
Estimated Natural Recharge, in acre-feet/year:	5,000	ADWR (1994)
	5,500	ADWR (1990) (HMS 18)
	<1,000	Freethey and Anderson (1986)
	1,000	Arizona Water Commission (1975)
	4,550 - 6,050	Briggs (1969)
Estimated Water Currently in Storage, in acre-feet:	21,700,000 (to 1,200 ft)	ADWR (1994)
	9,000,000[1] (to 1,200 ft)	Freethey and Anderson (1986)
	27,000,000 (to 1,200 ft)	Arizona Water Commission (1975)
	15,400,000 - 22,200,000	Johnson (1990)
Current Number of Index Wells:	19	
Date of Last Water-level Sweep:	2004 (133 wells measured)	

[1]Predevelopment Estimate

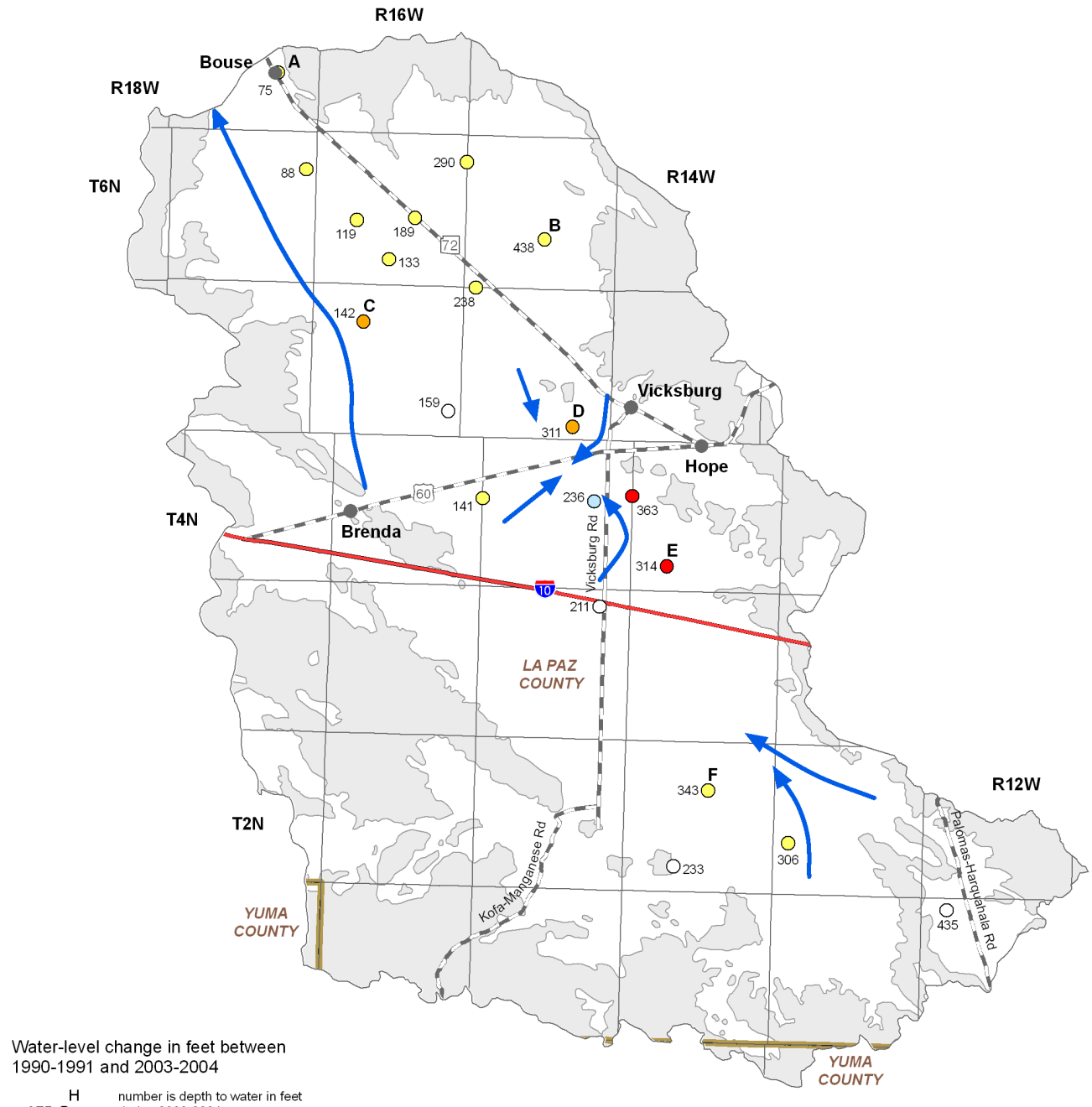


Figure 7.7-5
Ranegras Plain Basin
Groundwater Conditions

Figure 7.7-6
Ranegras Plain Basin
Hydrographs Showing Depth to Water in Selected Wells

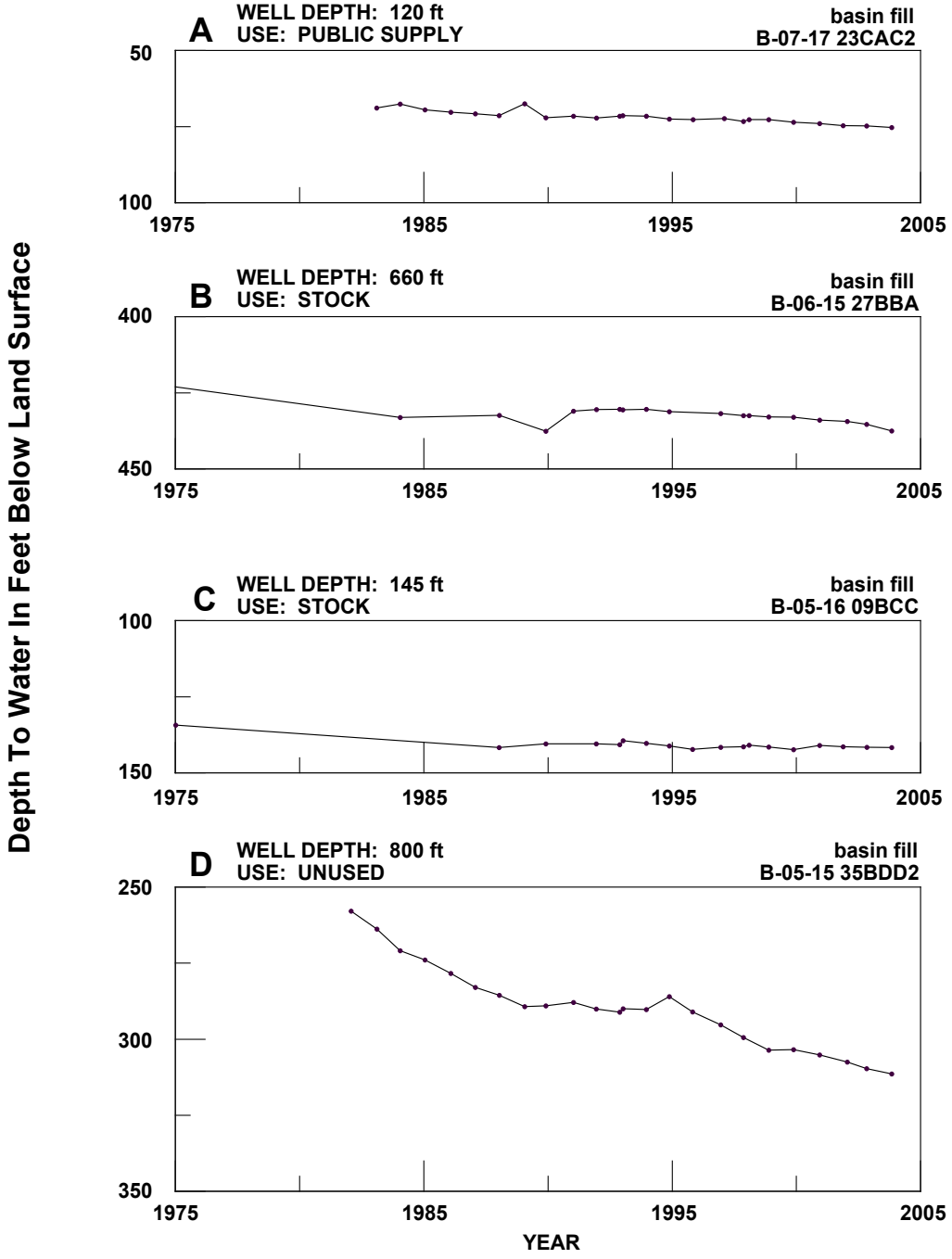
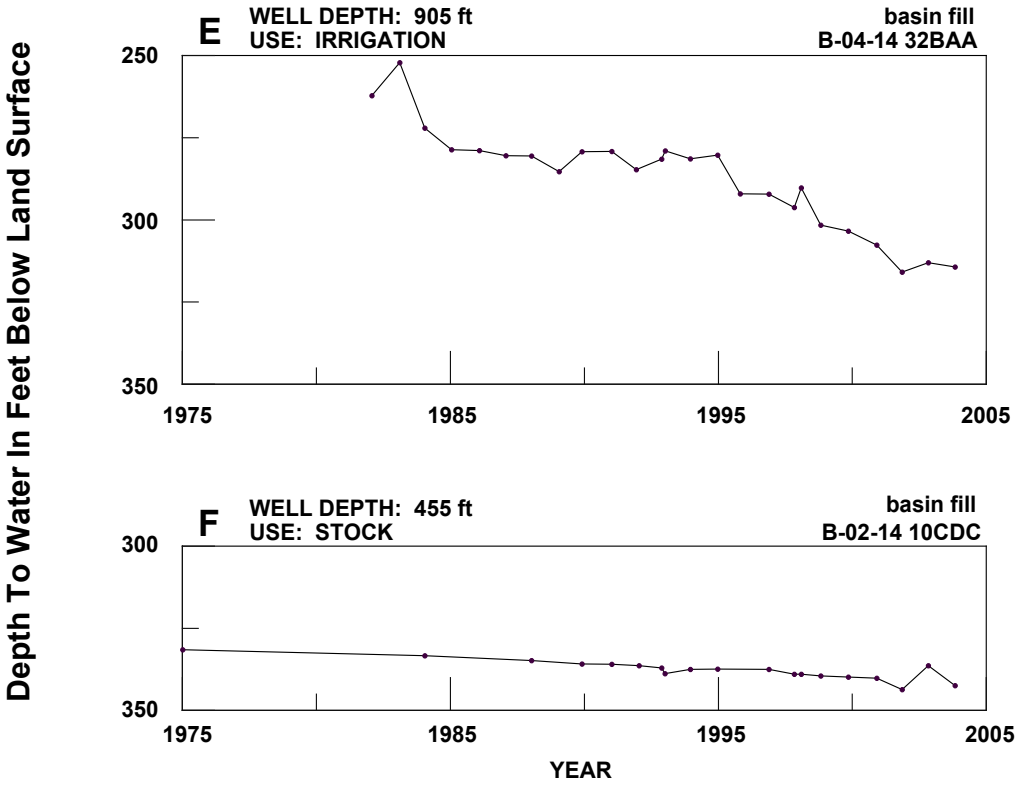


Figure 7.7-6 (cont'd)
Ranegras Plain Basin
Hydrographs Showing Depth to Water in Selected Wells



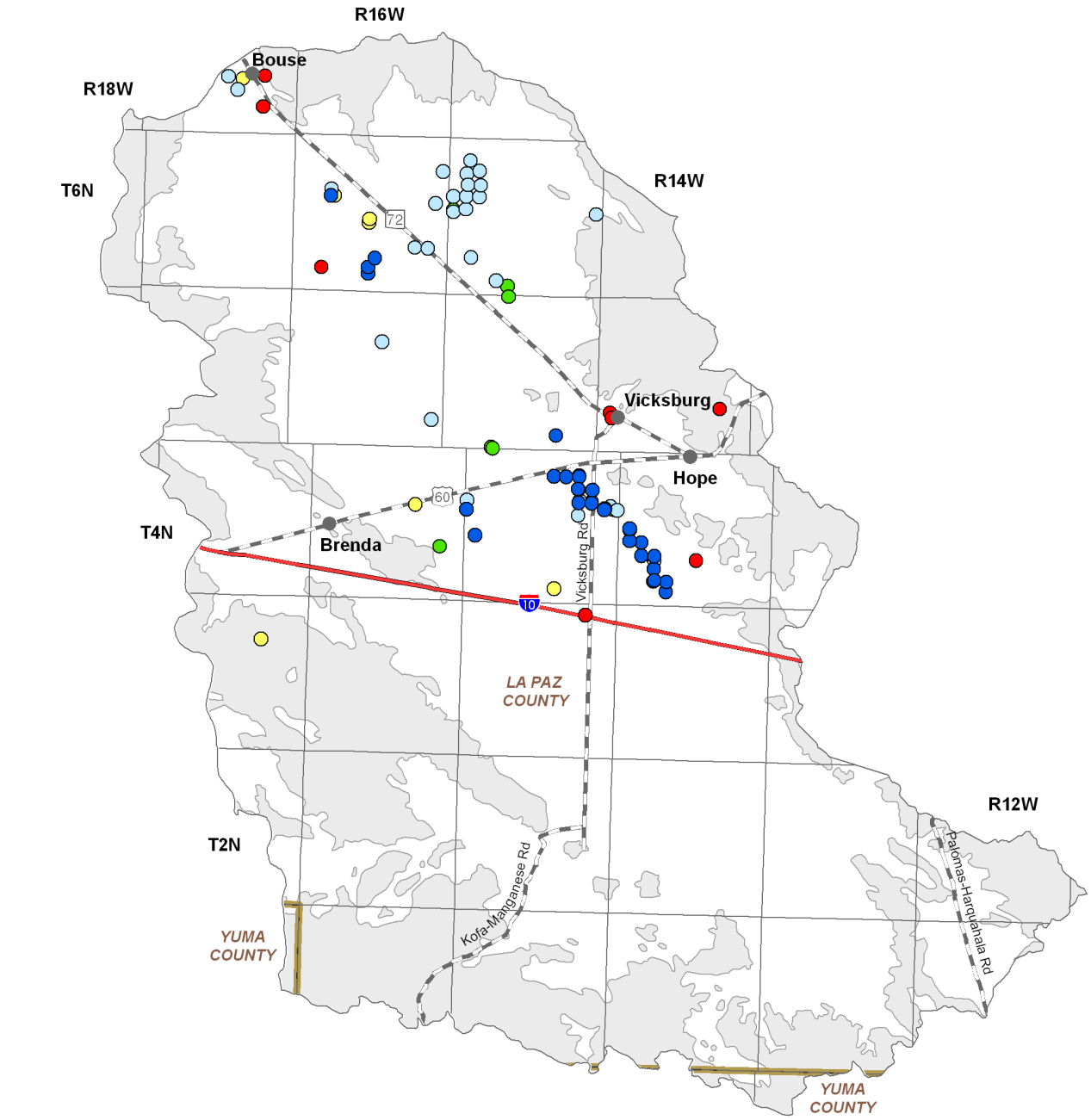


Figure 7.7-7
Ranegras Plain Basin
Well Yields

7.7.7 Water Quality of the Ranegras Plain Basin

Wells, springs and mine sites with parameter concentrations that have equaled or exceeded drinking water standard(s), including location and parameter(s) are shown in Table 7.7-7A. There are no impaired lakes or streams in this basin. Figure 7.7-8 shows the location of water quality occurrences keyed to Table 7.7-7. A description of water quality data sources and methods is found in Volume 1, Section 1.3.18. Not all parameters were measured at all sites; selective sampling for particular constituents is common.

Wells, Springs and Mine Sites

- Refer to Table 7.7-7A.
- Ninety-one wells have parameter concentrations that have equaled or exceeded drinking water standards.
- Seventy-one percent of the wells equaled or exceeded the parameter for fluoride.
- Other parameters equaled or exceeded include arsenic, barium, chromium, lead, nitrate and total dissolved solids.

Table 7.7-7 Water Quality Exceedences in the Ranegras Plain Basin[1]

A. Wells, Springs and Mines

Map Key	Site Type	Site Location			Parameter(s) Concentration has Equaled or Exceeded Drinking Water Standard (DWS)[2]
		Township	Range	Section	
1	Well	7 North	17 West	22	As, F
2	Well	7 North	17 West	23	As, F
3	Well	7 North	17 West	23	As, F
4	Well	7 North	17 West	23	As, F
5	Well	7 North	17 West	35	As, F
6	Well	6 North	15 West	6	NO3
7	Well	6 North	15 West	6	NO3
8	Well	6 North	15 West	7	NO3, TDS
9	Well	6 North	15 West	8	F
10	Well	6 North	15 West	8	F
11	Well	6 North	15 West	18	F
12	Well	6 North	15 West	18	F
13	Well	6 North	15 West	30	As, F
14	Well	6 North	15 West	30	As, F
15	Well	6 North	15 West	30	As, F
16	Well	6 North	15 West	32	As, F
17	Well	6 North	15 West	33	Pb
18	Well	6 North	15 West	33	As, Pb
19	Well	6 North	16 West	12	F
20	Well	6 North	16 West	15	Cr
21	Well	6 North	16 West	15	Cr, TDS
22	Well	6 North	16 West	16	F
23	Well	6 North	16 West	17	F
24	Well	6 North	16 West	17	As
25	Well	6 North	16 West	17	As, F
26	Well	6 North	16 West	20	F
27	Well	6 North	16 West	22	F
28	Well	6 North	16 West	23	As, NO3, TDS
29	Well	6 North	16 West	23	F
30	Well	6 North	16 West	26	NO3, TDS
31	Well	6 North	16 West	32	As, F
32	Well	6 North	16 West	34	As, F
33	Well	6 North	17 West	12	As, F
34	Well	6 North	17 West	12	Ba
35	Well	6 North	17 West	12	F
36	Well	5 North	15 West	4	As, F
37	Well	5 North	15 West	4	As, F
38	Well	5 North	15 West	6	F, NO3, TDS
39	Well	5 North	15 West	20	As, F
40	Well	5 North	15 West	21	F
41	Well	5 North	15 West	30	As, F, NO3, TDS
42	Well	5 North	16 West	9	As, F, Pb
43	Well	5 North	16 West	10	As, F
44	Well	4 North	14 West	4	As
45	Well	4 North	14 West	19	As, F
46	Well	4 North	14 West	19	As, F, NO3
47	Well	4 North	14 West	19	F
48	Well	4 North	14 West	19	As, F, NO3
49	Well	4 North	14 West	29	As, F
50	Well	4 North	14 West	29	F
51	Well	4 North	14 West	29	F
52	Well	4 North	14 West	30	As, Cr, F
53	Well	4 North	14 West	32	As, Cr, F
54	Well	4 North	14 West	32	As, Cr, F, NO3
55	Well	4 North	14 West	32	F
56	Well	4 North	15 West	8	F, NO3
57	Well	4 North	15 West	8	As
58	Well	4 North	15 West	9	As, NO3

Table 7.7-7 Water Quality Exceedences in the Ranegras Plain Basin (cont'd.)[1]

A. Wells, Springs and Mines

Map Key	Site Type	Site Location			Parameter(s) Concentration has Equaled or Exceeded Drinking Water Standard (DWS)[2]
		Township	Range	Section	
59	Well	4 North	15 West	10	F
60	Well	4 North	15 West	10	F
61	Well	4 North	15 West	11	F
62	Well	4 North	15 West	11	As, Cr, F, NO3
63	Well	4 North	15 West	11	F
64	Well	4 North	15 West	13	As, Cr, F
65	Well	4 North	15 West	13	F
66	Well	4 North	15 West	13	As, F
67	Well	4 North	15 West	13	F
68	Well	4 North	15 West	14	As, F, NO3
69	Well	4 North	15 West	14	As, F, NO3, TDS
70	Well	4 North	15 West	14	As
71	Well	4 North	15 West	18	As
72	Well	4 North	15 West	18	As, F
73	Well	4 North	15 West	23	F
74	Well	4 North	15 West	28	As, NO3
75	Well	4 North	16 West	9	As, F
76	Well	4 North	16 West	13	As
77	Well	4 North	16 West	13	As, F
78	Well	4 North	16 West	13	As
79	Well	4 North	16 West	15	As, F
80	Well	4 North	16 West	18	As
81	Well	4 North	16 West	18	As
82	Well	4 North	16 West	19	As
83	Well	4 North	16 West	19	As
84	Well	3 North	14 West	11	F
85	Well	3 North	15 West	2	As, F, NO3
86	Well	3 North	15 West	2	As, F
87	Well	3 North	15 West	2	As, Cr, F
88	Well	3 North	15 West	23	As, F
89	Well	2 North	13 West	19	As
90	Well	2 North	14 West	10	As
91	Well	2 North	14 West	28	NO3

B. Lakes and Streams

Map Key	Site Type	Site Name	Length of Impaired Stream Reach (in miles)	Area of Impaired Lake (in acres)	Designated Use Standard[3]	Parameter(s) Exceeding Use Standard[2]
None identified by ADWR at this time						

Notes:

[1] Water quality samples collected between 1979 and 2000.

[2] As = Arsenic
Ba = Barium
Cr = Chromium
F = Fluoride
Pb = Lead
NO3 = Nitrate/ Nitrite
TDS = Total Dissolved Solids

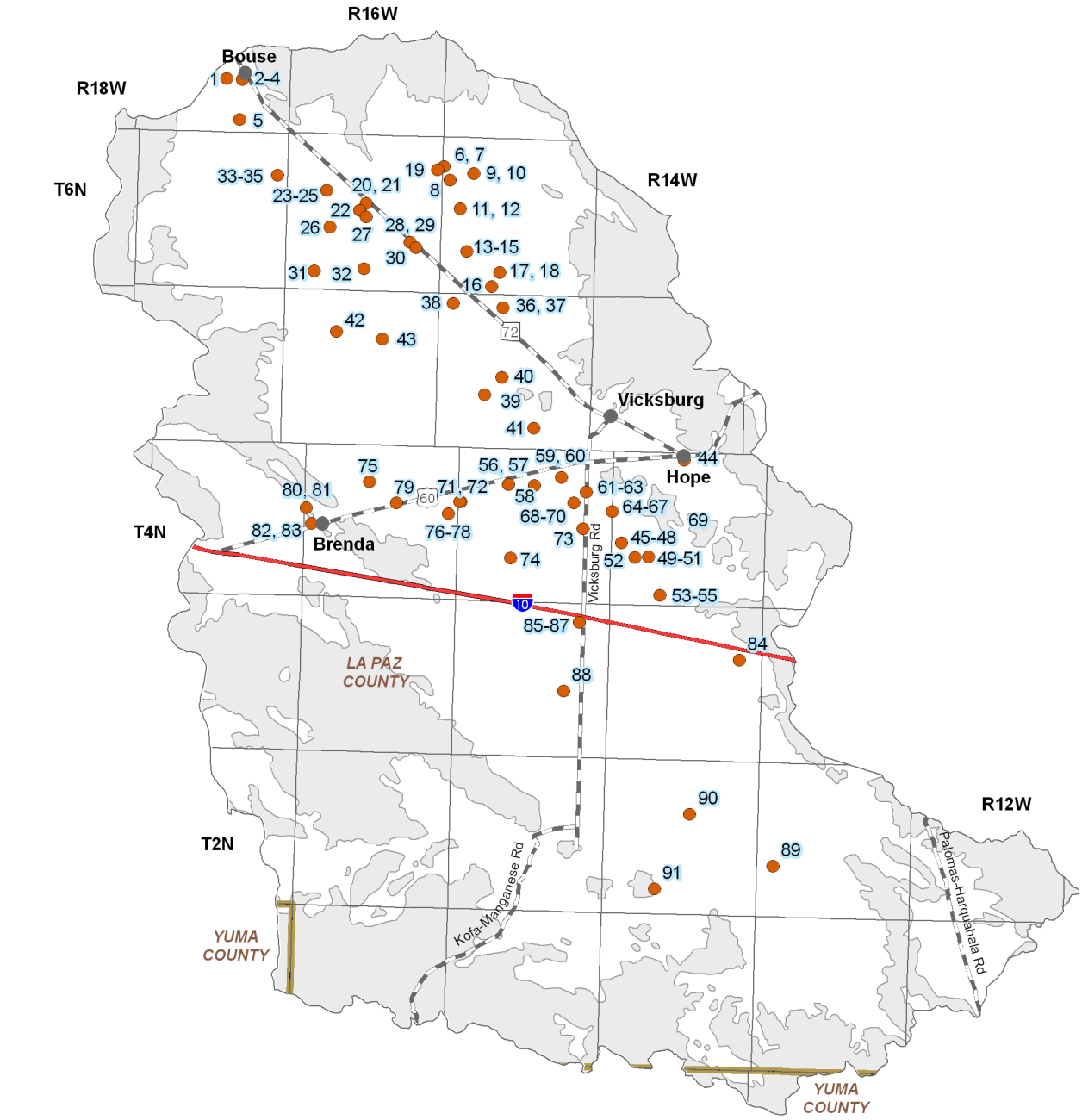


Figure 7.7-8
Ranegras Plain Basin
Water Quality Conditions

7.7.8 Cultural Water Demands in the Ranegras Plain Basin

Cultural water demand data including population, number of wells and the average well pumpage and surface water diversions by the municipal, industrial and agricultural sectors are shown in Table 7.7-8. Figure 7.7-9 shows the location of demand centers. There is no recorded effluent generation in this basin. A description of cultural water demand data sources and methods is found in Volume 1, Section 1.3.5. More detailed information on cultural water demands is found in Section 7.0.7.

Cultural Water Demands

- Refer to Table 7.7-8 and Figure 7.7-9.
- Population in this basin declined from 1,024 in 1980 to 581 in 1990 but is slowly increasing. The 2000 basin population was 904. Projections suggest an increase to 7,581 in 2050.
- There are no reported surface water diversions in this basin.
- Most cultural water use is for irrigation in the northern half of the basin.
- Groundwater use for agriculture decreased 3% from 1991 to 2003 with 28,500 acre-feet of demand on average between 2000 and 2003.
- Municipal groundwater demand is relatively small and increased 33% between 1996 and 2003.
- There was no reported industrial groundwater demand from 1991 to 2003. A dairy/bio-refinery is scheduled to begin operation in late 2007 and another dairy began operating in December 2006.
- As of 2003 there were 524 registered wells with a pumping capacity of less than or equal to 35 gallons per minute and 74 wells with a pumping capacity of more than 35 gallons per minute.

Table 7.7-8 Cultural Water Demands in the Ranegras Plain Basin[1]

Year	Recent (Census) and Projected (DES) Population	Number of Registered Water Supply Wells Drilled		Average Annual Demand (in acre-feet)						Data Source
				Well Pumpage			Surface-Water Diversions			
		Q ≤ 35 gpm	Q > 35 gpm	Municipal	Industrial	Irrigation	Municipal	Industrial	Irrigation	
1971		194[2]	58[2]	18,000			NR			ADWR (1994)
1972										
1973										
1974										
1975										
1976				11,000			NR			
1977										
1978										
1979										
1980	1,024									
1981	980	70	8	35,000			NR			
1982	935									
1983	891									
1984	847									
1985	802									
1986	758	60	2	31,000			NR			
1987	714									
1988	669									
1989	625									
1990	581									
1991	613	48	2	<300	NR	29,500	NR			USGS (2005)
1992	645									
1993	678									
1994	710									
1995	742									
1996	775	95	3	300	NR	32,000	NR			
1997	807									
1998	839									
1999	872									
2000	904									
2001	954	31	1	400	NR	28,500	NR			
2002	1,005									
2003	1,055									
2010	1,407									
2020	2,139									
2030	3,252									
2040	4,945									
2050	7,518									
ADDITIONAL WELLS:[3]		**26**								
WELL TOTALS:		**524**	**74**							

[1] Does not include evaporation losses from stockponds and reservoirs.

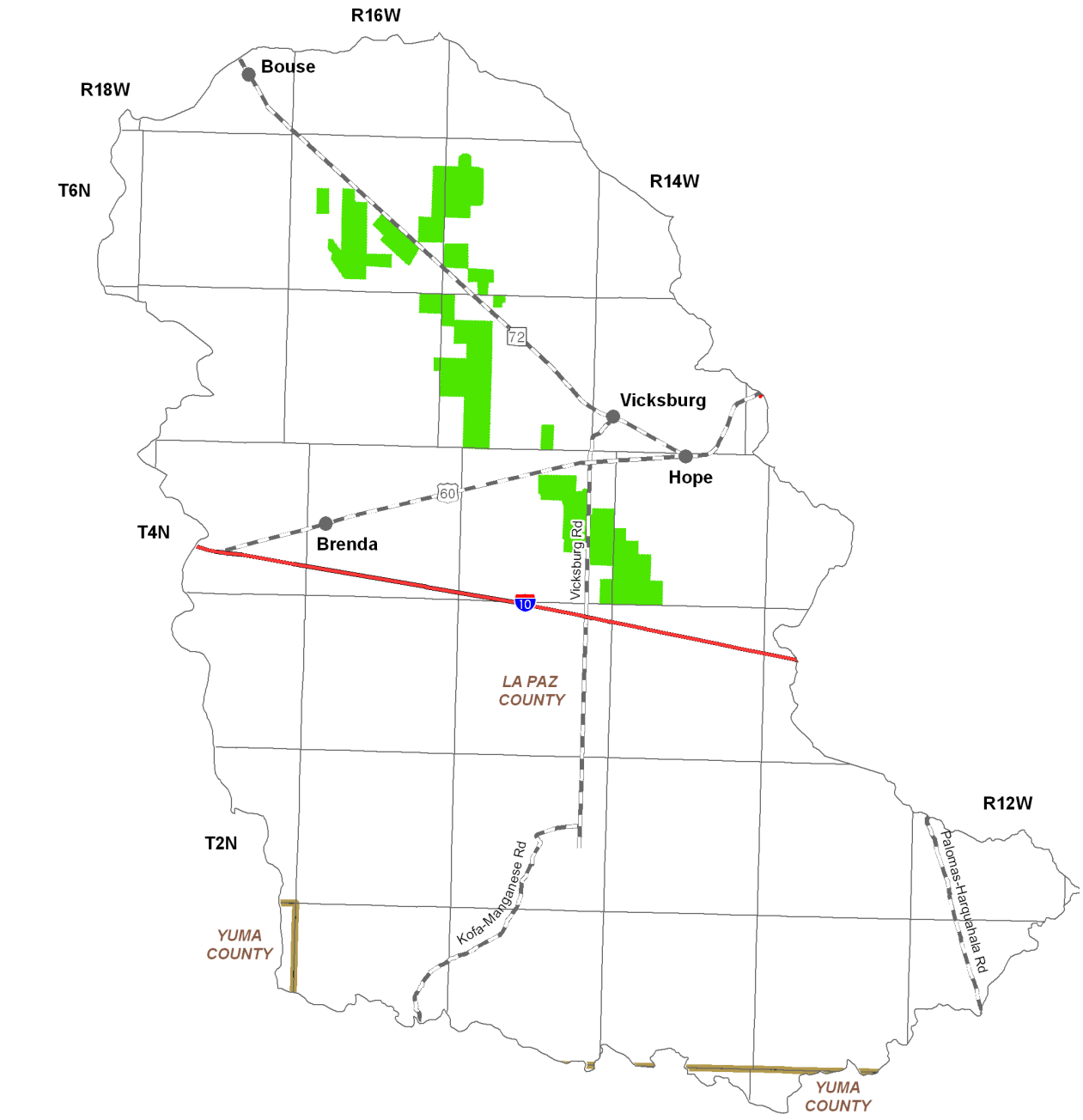
[2] Includes all wells through 1980.

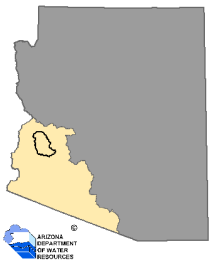
[3] Other water-supply wells are listed in the ADWR Well Registry for this basin, but they do not have completion dates. These wells are summed here.

NR - Not reported

Table 7.7-9 Effluent Generation in the Ranegras Plain Basin

Facility Name	Ownership	City/Location Served	Population Served	Volume Treated/Generated (acre-feet)	Disposal Method							Current Treatment Level	Population Not Served	Year of Record
					Water-course	Evaporation Pond	Irrigation	Golf Course	Wildlife Area	Discharged to Another facility	Infiltration Basins			
No Waste Water Treatment Facilities Identified by ADWR in this Basin														





0 3 6
Miles

Demand Centers

- Agriculture
- COUNTY
- Interstate Highway
- Major Road
- City, Town or Place

Figure 7.7-9
Ranegras Plain Basin
Cultural Water Demand

Primary Data Source: USGS National Gap Analysis Program, 2004

7.7.9 Water Adequacy Determinations in the Ranegras Plain Basin

Water adequacy determination information including the subdivision name, location, number of lots, adequacy determination, reason for an inadequacy determination, date of determination and subdivision water provider are shown in Table 7.7-11. Figure 7.7-11 shows the general locations of subdivisions (to the section level) keyed to the Table. A description of the Water Adequacy Program is found in Volume 1, Appendix A. Adequacy determination data sources and methods are found in Volume 1, Sections 1.3.1.

Water Adequacy Reports

- See Table 7.7-10
- As of May 2005, four subdivisions have been reviewed for an adequacy determination. All subdivisions are in La Paz County.
- Of the 135 lots in four subdivisions, 26 lots or 19% were determined to be adequate.
- The most common reason for a determination of inadequacy is water quality.

Table 7.7-10 Adequacy Determinations in the Ranegras Plain Basin[1]

Map Key	Subdivision Name	County	Location			No. of Lots	ADWR File No.[2]	ADWR Adequacy Determination	Reason(s) for Inadequacy Determination[3]	Date of Determination	Water Provider at the Time of Application
			Township	Range	Section						
1	Desert Rose Acres Tract 135	La Paz	6 North	16 West	22	64	22-400809	Inadequate	C	10/22/02	Dry Lot Subdivision
2	Desert Shadows	La Paz	4 North	16 West	19	26		Adequate		01/10/94	Desert Shadows Water District
3	Eden Park RV Subdivision	La Paz	4 North	15 West	1	16	22-400701	Inadequate	D	05/28/02	Eden Park Homeowners Association
4	Faybol Subdivision	La Paz	6 North	16 West	34	29	22-300247	Inadequate	A1,C	01/28/97	Dry Lot Subdivision

Notes:

[1]Each determination of the adequacy of water supplies available to a subdivision is based on the information available to ADWR and the standards of review and policies in effect at the time the determination was made. In some cases, ADWR might make a different determination if a similar application were submitted today, based on the hydrologic data and other information currently available, as well as current rules and policies.

[2] Prior to February 1995, ADWR did not assign file numbers to applications for adequacy determination.

[3] A. Physical/Continuous
1) Insufficient Data (applicant chose not to submit necessary information, and/or available hydrologic data insufficient to make determination)
2) Insufficient Supply (existing water supply unreliable or physically unavaible; for groundwater, depth-to-water exceeds criteria)
3) Insufficient Infrastructure (distribution system is insufficient to meet demands or applicant proposed water hauling)

B. Legal (applicant failed to demonstrate a legal right to use the water or failed to demonstrate the provider's legal authority to serve the subdivision)

C. Water Quality

D. Unable to locate records

NA = Data not currently available to ADWR

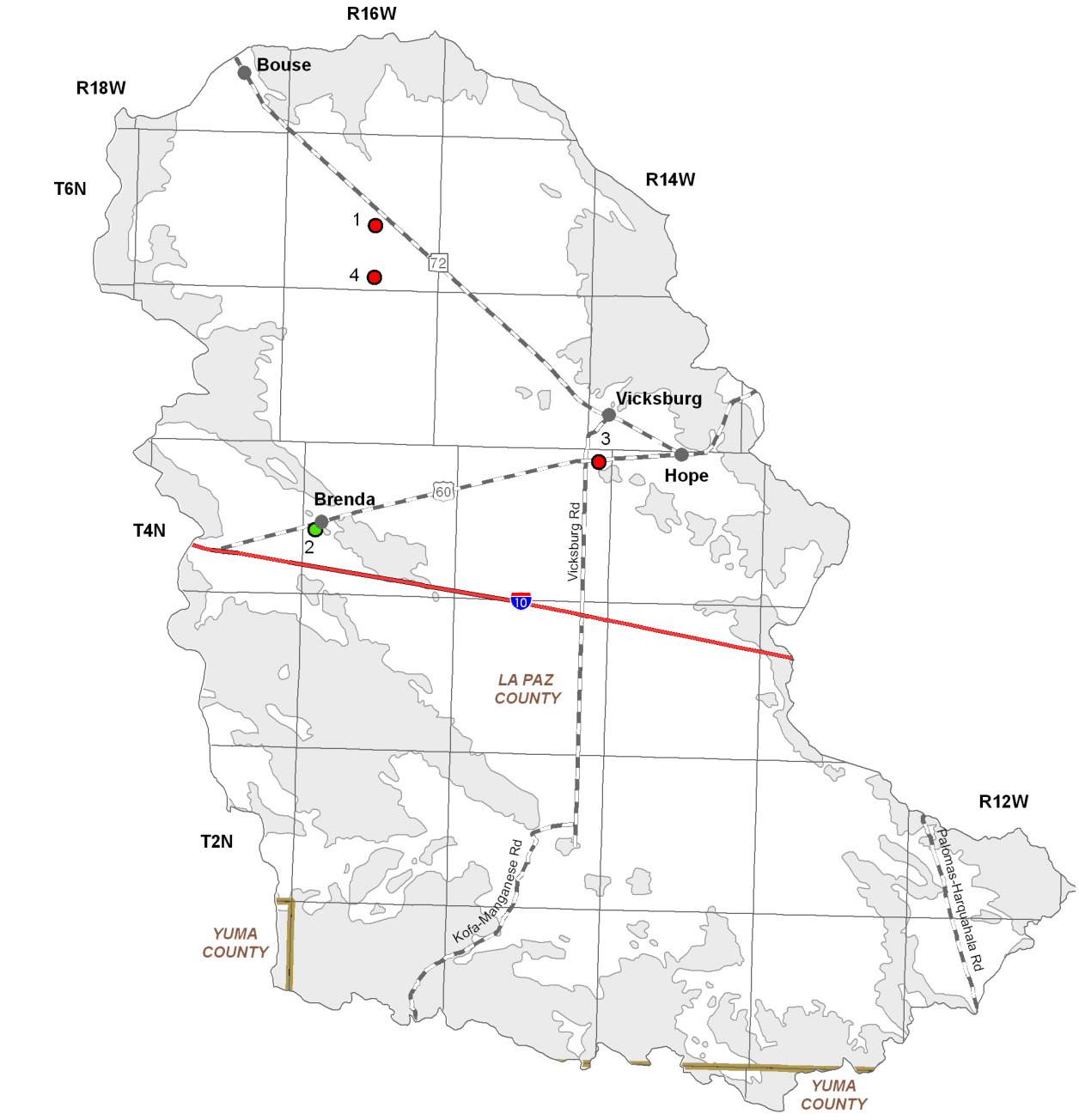


Figure 7.7-11
Ranegras Plain Basin
Adequacy Determinations

Ranegras Plain Basin
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